IN THE CLAIMS

Please substitute the following listing of claims for the previous listing of claims.

1. (original) An electron beam apparatus comprising:

(a) a beam source to generate a radiation beam;

(b) a photocathode comprising an electron-emitting material composed of activated alkali halide having a minimum electron emission energy level that is less than 75% the minimum electron emission energy level of the un-activated alkali halide, whereby the electron-emitting material emits electrons when the radiation beam is incident thereon;

(c) electron beam elements to form an electron beam from the emitted electrons and direct the electron beam onto a workpiece; and

(d) a support to support the workpiece.

2. (original) An apparatus according to claim 1 wherein the electron-emitting material is composed of activated alkali halide having a minimum electron emission energy level that is less than 50% of the minimum electron emission energy level of the un-activated alkali halide.

3. (original) An apparatus according to claim 1 wherein the activated alkali halide comprises a minimum electron emission energy level that is less than about 5 eV.

4. (original) An apparatus according to claim 1 wherein the un-activated alkali halide absorbs a first level of a radiation capable of creating color centers to form the activated alkali halide, and the activated alkali halide absorbs a second level of the same radiation to emit electrons.

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5. (original) An apparatus according to claim 1 wherein the activated alkali halide comprises an interior region having a first alkali concentration, and a surface region having a second alkali concentration that is higher than the first alkali concentration.

6. (original) An apparatus according to claim 5 wherein the second alkali concentration is higher than the first alkali concentration by at least a fraction of a monolayer of alkali atoms.

7. (original) An apparatus according to claim 1 wherein the alkali halide comprises cesium halide.

8. (original) An apparatus according to claim 7 wherein the cesium halide comprises cesium bromide or cesium iodide.

9. (original) An apparatus according to claim 1 wherein the beam source comprises (i) a diode-pumped laser or argon-ion laser, and (ii) a frequency multiplier crystal.

10. (original) An apparatus according to claim 1 wherein the beam source comprises a laser having a wavelength of from about 190 to about 532 nm.

11. (currently amended) An electron beam pattern generator to generate a pattern of electrons on a workpiece, the pattern generator comprising:

(a) a laser beam source to generate a laser beam having a wavelength of from about 190 to about 532 nm;

(b) a beam modulator to modulate the intensity of the laser beam according to a pattern and direct the modulated laser beam onto a photocathode;

(c) a photocathode comprising an electron-emitting material composed of activated alkali halide having a minimum electron emission energy that is less than about 5 eV, such that the electron-emitting material emits electrons when the modulated laser beam is incident thereon;

(d) electron beam elements to form an electron beam from the emitted electrons and direct the electron beam onto a workpiece; and

(e) a support to support the workpiece.

12. (currently amended) An electron beam inspection apparatus to inspect a workpiece with electron beams, the apparatus comprising:

(a) a beam source to generate a laser beam having a wavelength of from about 190 to about 532 nm;

(b) a photocathode comprising an electron-emitting material composed of activated alkali halide having an electron emission minimum energy that is less than about 5eV, such that the electron-emitting material emits electrons when the laser beam is incident thereon;

~~(d)~~(c) electron beam elements to form an electron beam from the emitted electrons and direct the electron beam onto a workpiece;

~~(f)~~(d) a support to support the workpiece; and

(e) an electron detector to detect electrons backscattered from the workpiece to inspect the workpiece.

13. (original) An electron generating method comprising:

(a) providing an electron-emitting material composed of alkali halide;

(b) activating the alkali halide to form an activated alkali halide having a minimum electron emission energy level that is less than 75% of the minimum electron emission energy level of the un-activated alkali halide; and

(c) directing a radiation beam on the activated alkali halide, the radiation beam having photons with an energy level that is higher than the minimum electron emission energy level of the activated alkali halide to cause electrons to be emitted therefrom.

14. (original) A method according to claim 13 wherein (b) comprises directing the radiation beam onto the alkali halide material for a sufficient time period that the alkali halide develops an interior region having a first alkali concentration and a surface region having a second alkali concentration.

15. (currently amended) A method according to claim 14 comprising directing the second radiation onto the alkali halide for from about 120 to about 240 minutes.

16. (original) A method according to claim 13 wherein (c) comprises modulating the radiation beam according to a pattern to generate modulated electron beams.

17. (original) A method according to claim 13 further comprising:

(d) detecting electrons backscattered from the workpiece to inspect the workpiece.

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18. (original) A method of manufacturing a photocathode for an electron beam apparatus, the method comprising:

(a) providing a substratum in a process zone;

(b) evacuating the process zone;

(c) evaporating an alkali halide in the process zone to deposit alkali halide on the workpiece; and

(d) activating the deposited alkali halide to have a minimum electron emission energy level that is less than half the electron emission minimum electron emission energy level of the un-activated alkali halide by directing radiation onto the deposited alkali halide for a sufficient time period to develop an interior region having a first alkali concentration and a surface region having a second alkali concentration that is higher than the first alkali concentration.

19. (currently amended) A method according to claim 18 wherein the radiation comprises a laser beam having a wavelength of from about 190 to about 532 nm.

20. (original) A method according to claim 18 wherein (c) comprises evaporating an alkali halide material comprising cesium bromide or cesium iodide.

21. (new) An electron beam pattern generator according to claim 11 wherein the electron-emitting material is composed of activated alkali halide having a minimum electron emission energy level that is less than 50% of the minimum electron emission energy level of the un-activated alkali halide.

22. (new) An electron beam pattern generator according to claim 11 wherein the activated alkali halide comprises an interior region having a first alkali concentration, and a surface region having a second alkali concentration that is higher than the first alkali concentration.

23. (new) An electron beam pattern generator according to claim 11 wherein the alkali halide comprises cesium halide.

24. (new) An electron beam pattern generator according to claim 23 wherein the cesium halide comprises cesium bromide or cesium iodide.

25. (new) An electron beam pattern generator according to claim 11 wherein the laser beam source comprises (i) a diode-pumped laser or argon-ion laser, and (ii) a frequency multiplier crystal.

26. (new) An electron beam inspection apparatus according to claim 12 wherein the electron-emitting material is composed of activated alkali halide having a minimum electron emission energy level that is less than 50% of the minimum electron emission energy level of the un-activated alkali halide.

27. (new) An electron beam inspection apparatus according to claim 12 wherein the activated alkali halide comprises an interior region having a first alkali concentration, and a surface region having a second alkali concentration that is higher than the first alkali concentration.

28. (new) An electron beam inspection apparatus according to claim 12 wherein the alkali halide comprises cesium halide.

29. (new) An electron beam inspection apparatus according to claim 28 wherein the cesium halide comprises cesium bromide or cesium iodide.

30. (new) An electron beam inspection apparatus according to claim 12 wherein the laser beam source comprises (i) a diode-pumped laser or argon-ion laser, and (ii) a frequency multiplier crystal.